ABSTRACT

The level of availability of after-sales parts is an important factor that needs to be considered in meeting customer needs. Fluctuating demand characteristics are a challenge for the Company in maintaining the level of availability and meeting customer needs. Inventory control needs to be done to ensure that the level of inventory availability can be optimal and can meet customer demand at the same time when the demand is at PT. XYZ.

The level of product fulfillment at the time of ordering (fill rate product) at PT. XYZ which is not yet in accordance with the target is a problem that needs to be corrected by controlling and proposing inventory policies. In the 2023 period, the product fill rate at PT XYZ only reached 91.38% of the minimum target of 95% for normal part class A category products. In that period, there was a total demand of 227,972 units and requests that could be fulfilled immediately were 208,326 units and those that were not fulfilled directly were 19,646 units, meaning that 8.62% of the total demand was backlogging or unfulfilled demand when the order was placed by the dealer.

This problem occurs based on internal and external factors found in the company. For internal factors, it is caused by the level of reorder point and safety stock that is not optimal so that when a reorder is placed and there is a request from a customer, the existing inventory cannot fulfill the request. In addition, there is no inventory dashboard which causes monitoring and controlling to be not optimal. From external factors, demand from customers, in this case dealers, fluctuates and there are obstacles in the import process such as goods being held for a long time and unable to leave the port. These factors can affect the inventory level and product fill rate at PT XYZ.

The proposed inventory policy is designed using the continuous review method by considering the expected backorder value. The objective function of the policy model is to achieve the overall fill rate target. The decision variables set are the value of the reorder point and safety stock with the limiting function of the fill rate on each part number and the total cost generated. The proposal is carried out for class A normal part category spare parts based on demand data for the period 2023. Demand forecasting is carried out to determine demand in the

coming period, namely the 2024 period. Before forecasting demand, sampling is first carried out using the k-means algorithm clustering technique to determine the sample size by looking at the demand data pattern. Forecasting is done using time series moving average, weighted moving average, and exponential smoothing methods and comparing the three methods using tracking signals. Exponential smoothing was chosen because it has a tracking signal value of 0.08.

The results of the proposed inventory policy using the continuous review method by considering the expected backorder value resulted in a total fill rate of 99.841% for actual demand conditions and 99.925 for forecasted demand. The total inventory cost generated based on the calculation of the inventory policy has decreased, the original total inventory cost was IDR 157,865,933,538.10 to IDR 143,045,972,743.25 for actual demand and IDR 147,636,346,083.76 for forecasted demand. The total average replenishment of inventory per part number which in the existing condition amounted to 7.4 per period decreased to 2.08 per period. Sensitivity analysis is performed on the order quantity, stock level, and expected backorder value parameters. In the order quantity parameter, the Q value is sensitive to the ordering cost and total inventory cost, a reduced Q value will cause the total cost of ordering and inventory to increase. The inventory level also affects the average replenishment per part number per year, if the inventory level is not optimal (shortage) it will cause the average replenishment per part number to increase. The calculation of the expected backorder value affects the total global fill rate, the higher the expected backorder value, the lower the resulting fill rate.

Keywords: Inventory policy, Fill Rate, Expected backorder